

Digitalization of Business Processes in Human Resources Management of Russian Industrial Enterprises

Jurij Odegov

Scientific School of Human Resources Management
Plekhanov Russian University of Economics
Moscow, Russia
hrm-trade@yandex.ru

Elena Malakhova

Department of History and Philosophy
Plekhanov Russian University of Economics
Moscow, Russia
elena_malahova@bk.ru

Andrei Garnov

Department of Economy of Industry
Plekhanov Russian University of Economics
Moscow, Russia
profgarnov@yandex.ru

Abstract—This article is dedicated to the problem of human resources management of industrial enterprises in digital economy. The relevance of the study is due to the need of adaptation of industrial enterprises to operating in the digital economy environment. The aim of the study is to analyze the current state of digitalization of the Russian industry and to identify the reasons that hinder the digitalization of business processes of human resources management. The research applies both Russian and international studies and statistical sources of information on the problems of digitization of human resources management. The analysis of Russian statistics shows that the industry enterprises lag behind other sectors of economy in digitalization of business processes of personnel management. This paper presents the most promising technologies in the field of recruitment, such as artificial intelligence, and describes the useful effect of their implementation. The internal and external reasons that constrain the digitalization of business processes of human resources management are listed: the macroeconomic situation, the lack of highly qualified specialists, the lack of information resources and software products, industry specifics, the interest of shareholders and managers of industrial enterprises in obtaining fast and not long-term results, the complexity of changing business processes in the established production. One of the main reasons is also the lack of investment. Among the general problems of digitalization and business activities in virtual space, the problems of information security, security of operations and cybercrime are mentioned as the most urgent. It is concluded that since the digitalization of business processes requires enterprises to attract significant resources, the solution to this problem can be public and governmental support for private investment. Industrial enterprises are encouraged to form industry associations for co-financing and reducing risks in implementation of projects for digital upgrade, as well as for interaction with public authorities, technology companies and research centers and for collaborative development of industry platforms, solutions and standards. With a sufficient amount of investment, the digitalization of business processes of all industrial enterprises can provide high

rates of economic growth and become the basis for the creation of the country's new economic structure. The results of the study can be used to improve the supporting mechanisms of the human resources management digitalization of national industry.

Keywords—digitalization; human resources management; recruitment; digital economy; industry

I. INTRODUCTION

Official documents of the Russian Federation define digital economy as the one in which "data in digital form is a key factor of production in all spheres of social and economic activity; the one that increases the competitiveness of the country, the quality of life of its citizens, ensures economic growth and national sovereignty" [the Governmental Program "Digital economy of the Russian Federation". The development of the digital economy in Russia is currently one of the leading factors in ensuring further socio-economic progress of the country [1, 15].

The digitalization of economy affects all aspects of functioning of the society as a whole and its organizations, including their human resources management [21]. Previously, the use of digital technologies in the field of human resources management was primarily associated with the automation of personnel records management, but now these technologies are the basis for accelerated changes, which result in new rules for working with personnel. Organizations are beginning to adopt fundamentally new approaches to labour, jobs and labour relations [7].

II. RESULTS AND DISCUSSION

Unfortunately, we still cannot regard the readiness of Russian industrial enterprises to implement new rules of working with personnel as high enough when it comes to the use of information and communications technologies (or ICT)

for the collection, storage, processing, retrieval, transmission and presentation of data in electronic form. In 2016, only 28% of manufacturing enterprises had access to the Internet at speeds above 30 Mbit/s. Digital business development is constrained by the low level of its representation in the Internet – 62% of manufacturing enterprises have websites, but only 8% support versions adapted for mobile devices. [2]

The state program "Digital economy of the Russian Federation", approved on July 28, 2017, is designed to provide a breakthrough in the development of the digital economy. In May 2018 Russian President Vladimir Putin instructed the government to adjust the program "Digital economy of the Russian Federation" to give it the status of a national program. The national program will include eight more Federal projects, proposals on which have already been formed by the relevant departments, in particular the project "Digital industry". The funding for this project may amount to 66.3 billion rubles, including 61 billion rubles from the Federal budget.

Currently the digitalization level of business processes in Russian manufacturing enterprises is still too low. In 2016, only 23% of enterprises had a high or very high level of digitalization. In 46% of enterprises the level of digitization was just low and in 31% of enterprises it was very low [2]. The percentage of organizations in the manufacturing sector of industries that use ERP systems in 2016 did not exceed 22%; organizations using SCM systems – 6% (Table 1). This is much lower than in countries with advanced digital economies.

TABLE I. THE USE OF INFORMATION TECHNOLOGIES IN HUMAN RESOURCES MANAGEMENT IN RUSSIA (% OF TOTAL NUMBER OF ORGANIZATIONS)

Indicators	2015	2016	2017 (preliminary estimates)	2018 (forecast)
Manufacturing enterprises using ERP systems	21.0	22.1	24.5	25.4
Manufacturing enterprises using digital simulators for personnel skills training	16.5	17.4	18.3	20.6
Entrepreneurial sector enterprises using the Internet for personnel recruitment	33.0	36.6	44.7	50.8
Entrepreneurial sector enterprises using the Internet for personnel professional training	40.1	39.7	40.5	42.2

Compiled by the authors on the basis of Rosstat database

According to the authors' forecast, information technologies will be increasingly introduced into the activities of industrial enterprises (Table I).

Digital transformation will affect all business processes [18]. The most noticeable effect of digitalization will be achieved in the development of new products and in human resources management.

Changing approaches to product development by minimizing the 'human factor' and by reduction of use of time and resources allows one to accurately design the product to meet the specified requirements not only at the stage of

production, but also at the stage of exploitation of industrial products.

Requirements can come from consumers, end users, regulators, organizations or other stakeholders. The digitalization of human resources management processes is already going on rapidly [3,14]. According to the results of a study conducted by Ward Howell, the vast majority of organizations have already automated the main business processes in the field of human resources management: personnel administration (76%), hiring (70%), development and training of personnel (39%) [24].

In the upcoming years, the most significant changes will occur in the business processes of recruitment, as digitalization significantly increases its accuracy and efficiency.

As for industrial enterprises, they are still not actively using the possibilities of digitalization of recruitment in comparison with other companies. Thus, the share of industrial enterprises using the Internet to search for new personnel is significantly lower than that of enterprises in other sectors of economy.

The share of industrial enterprises using the Internet to search for the main categories of personnel was 75%, including 63% of enterprises that were searching for workers, 68% – for specialists, 55% – for managers. In comparison, in the extractive industry the share of enterprises using the Internet to search for the main categories of personnel was 76%, in trade – 80%, in finance – 84%. The use of Internet recruiting opportunities is directly related to the state of the enterprise (financial indicators, wages, belonging to highly competitive industries) and interest in the best staff, not in saving money on the search for personnel [21].

Digitalization of this business process is possible with the help of specialized modules for search and recruitment (ATS – applicant tracking systems). They affect all the technological stages of selection: a description of the requirements for the candidate, search and attraction of candidates, the choice of the most appropriate positions for candidates and labor relations registration.

As the amount of collected data in the systems of personnel selection automation increases, the use of artificial intelligence becomes more and more relevant. It is used both to perform routine operations and to predict the future performance of candidates. One of the new tools in the field of recruitment based on artificial intelligence is a 'virtual recruiter', which operates without human intervention and determines the appropriate audience; automatically searches for relevant applicants, attracting them with the help of modern tools, including social networks; performs pre-selection of candidates by phone, through chat rooms and video interviews. Therefore, it can significantly reduce the time spent on hiring employees.

Thus new services and applications regularly emerge in a sphere of human resources management. They allow companies to automate all routine operations: resume search, formation of a database of candidates for specific job

vacancies, calls and correspondence with candidates, primary screening, organizing interviews.

However, it is advisable for companies to use full-featured automation systems of human resources management (HCM – human capital management), since the recruitment of personnel is linked to other business processes, such as personnel planning, personnel adaptation, etc.

HCM systems combine all business processes of human resources management and allow to increase productivity, reduce costs, improve loyalty and motivation of employees. Using the data obtained by HCM-systems, it is possible to conduct HR analytics, which is focused on maximizing the use of huge amounts of data on the workforce collected by most companies.

As a result, the company is able to analyze the data and create predictive models on which to make effective business decisions.

It is HR analytics that gives us a deep understanding of the processes occurring with the staff of the company: those in work and those who leave; motives to excel in doing a job; causes of demotivation; reasons of come and leave of the best employees; factors that influence the effectiveness of employees; security problem areas, etc.

In addition, HCM systems simplify the task of attracting and retaining the most talented professionals. In modern conditions talented professionals are the main resource that determines the success of the enterprise. The company's ability to find, develop and retain talent is a long-term competitive advantage.

The theory that the talent wins its way all by itself is long gone – it is replaced by the talent management that, once being just a program of a human resources management, has now turned into a trend.

The war for talents, which refers to the process of attracting and retaining qualified staff of strategic importance to the organization, creates a new reality in the business world. In earlier times confrontation with competitors was carried out mainly in the sphere of struggle for attracting consumers of products and services, but now a new ‘battlefield’ has been discovered – the labor market, where the struggle for highly qualified specialists turns into an aggressive ‘war’ [17]. Competition for talent becomes more acute than ever.

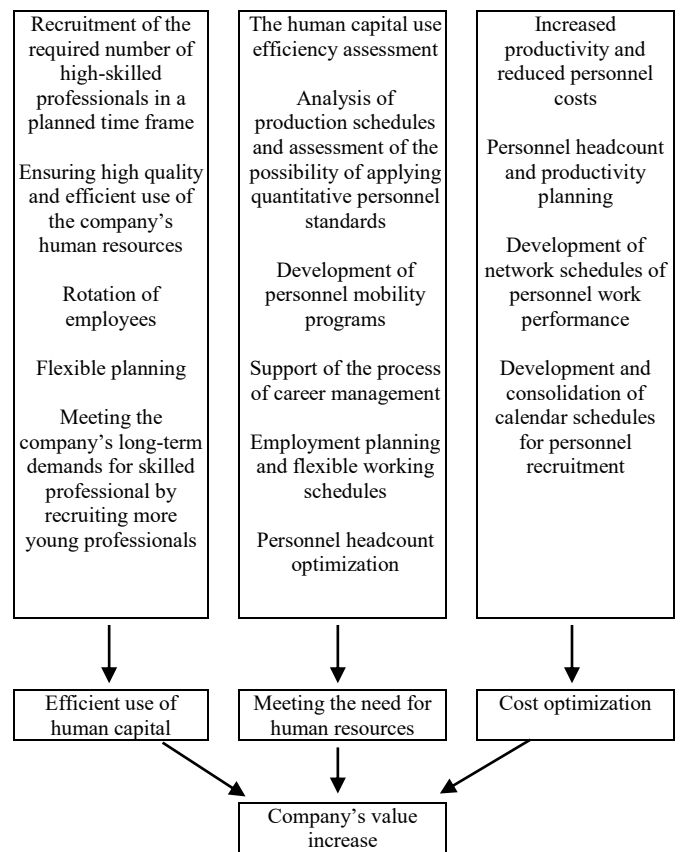
Digitalization also opens up new opportunities for corporate learning. Currently there are a large number of tools for both full-time and online learning format, using a variety of technologies and technical solutions: from a simple presentation to technical equipment simulators and virtual reality.

The rapid development of digitalization of business processes is due to the significant advantages that the company gets. Due to optimization and automation of production processes, it is possible to increase the efficiency of equipment use, quality of design and manufacture of products, speed of production, quality of customer service. The companies can also reduce the time to complete the production cycle, labor intensity and cost of production, etc.

Digitalization optimizes business processes and significantly increases the chances of the enterprise to win in the competitive struggle. The efficiency of digital business processes provides a significant long-term advantage [6].

In the modern economy, the key priority for an industrial enterprise is the ability to respond quickly to changes in the external environment. Virtual digital models of products and production systems provide this capability. Virtualization, manifested in the integration of ICT and the resulting processes of globalization, leads to the emergence of network effects: the creation of additional factors of value added growth, which arise, on the one hand, with the possibility of reducing production costs by increasing the speed of transmission and processing of information, and on the other hand – because of the greater market attractiveness of goods and services as a result of reducing the time for the development of new products.

TABLE II. DIGITALIZATION ADVANTAGES FOR COMPANIES’ HUMAN RESOURCES MANAGEMENT



Companies are aware of the benefits that the digitalization can offer [25]. Thus, according to the results of a collaborative study of Microsoft and the Hult International Business School – in the small and medium-sized enterprises market in Central and Eastern Europe (including Russia), more than 70% of Russian companies believe that digitalization provides flexibility. 85% agree that these technologies allow to save time on routine operations and are essential in solving strategic problems. Automation of business processes is

considered to be the most promising trend of the company's digital business technologies. It is interesting that Russian businessmen pay increased attention to the introduction of innovations directly into business processes (19% in Russia, 12% in Europe), which only confirms the thesis about the high potential for the growth of digitalization of Russian small and medium enterprises and their economic ambitions (34% in Russia, 23% in Europe) [22]

Still, the dynamics of digitalization in Russia is constrained by a number of reasons, both internal and external. Internal reasons include, for example, the interest of shareholders and managers in getting profit quickly rather than achieving long-term results. In some industries, the rearrangement of well-established business production can be a painful process itself and the industry specifics can lead to self-enclosure and ignoring of the requirements of the cooperation partners.

External reasons include, for example, the macroeconomic situation, the lack of highly qualified specialists, the lack of information resources and software products. But the main reason that hinders the pace of introduction of digital technologies in Russian industry is the lack of investment.

The volume of investments of private companies in digitalization in Russia is only 2.2% of Gross Domestic Product, while in the US it reaches 5%, in Western Europe – 3.9% [2]. Russia is dominated by direct targeted funding from budgets of various levels, mostly from the Federal budget, as well as from state extra-budgetary funds and organizations. The allocation of funds within the amount available in the budget is carried out by the government.

The digitalization of business processes of any enterprise involves not only the installation of modern software, but also fundamental changes in approaches to management, corporate culture, external communications [16].

In addition, among precarious issues of the digital economy and the activities in the virtual space in general, we can mention the problems of information security, security of operations and cybercrime [4, 5, 8, 11].

Many authors warn about the need to anticipate the long-term results of the use of digital technologies and the possible dangers of their uncontrolled application. The article by Sarah Wadmann and Klaus Hoeyer [23] describes social consequences in a form of scandals and loss of reputation – all that can happen if users of automated systems become aware that the information about them was used for purposes that they did not know about, and in ways they did not give their permission for. Ordinary customers and sometimes even employees of various organizations in fact do not always have the opportunity to learn and control where their personal data is sent, and for what purposes this data can be used.

A lot of questions for business can also arise in the legal field. Business development in the digital age often requires access to a variety of high-tech products of intellectual activity. However, those, in turn, may be subject to copyright, giving the copyright holder a monopoly on their distribution and limitation of this distribution, even in cases of non-commercial use or use in scientific research [9, 10, 20]. The

development of various forms of so-called public licenses is perhaps one example of a search for a balance, including the legal one, between the interests of public and private stakeholders in the sphere of digital communications. This public interest is often expressed by groups of highly educated professionals in business and scientific fields, who become the engine of economic progress in the digital society and therefore can be especially affected by lack of access to information.

Along with the regulation of property rights in the digital environment, the modern business community is also forced to solve new problems that arise in a field of social responsibility of companies and social protection of employees [19].

According to Hans-Horst Konkolewsky, the General Secretary of the International Social Security Association, the digitalization of economy creates new problems for the institutions of social security and protection – the issues primarily related to changes in the structure of labor market and the relationship between employees and employers. These are, in particular, issues of the status of workers offering goods and services through various digital platforms; increasing number of self-employed and temporarily employed workers whose access to social protection systems differs from the one present in traditional forms of employment inherent in industrial societies [12].

While pessimists say that all these changes will inevitably lead to the collapse of the established social security systems, optimists, on the contrary, speak about the ways of constructive transformation of existing institutions. The use of Big Data and artificial intelligence systems can significantly increase the quality of services, reduce the risk of errors and various frauds. Digital technologies can make social security much more personalized and available online all the time [12].

However, their effective use requires both special legal mechanisms and an increase in the level of personal responsibility of all those involved in the digital economy: employers, freelancers, temporarily employed workers and consumers of goods or services.

Almost all societies of the recent past had collective forms of responsibility as the basis for the stability of their structure. A group or an organization as well as any social institution could act as a generalized subject of this responsibility. But the trait of the information society, according to many of its researchers, is the heightened responsibility of the individual. This is associated with a flexible and decentralized structure of new communities which does not support social roles and statuses rigidly and unambiguously assigned to the individual. However, individual responsibility does not mean autonomy. On the contrary, it can lead to the strengthening of ties between individuals and the state at a new level, as Pascal D. König shows [13]. The conditionality of obtaining social guarantees, according to him, in the information society will increasingly depend on the responsible behavior of the individual, which will be monitored by Big Data technologies. According to this author, the more consciously each individual citizen will approach the fulfillment of his or her social obligations, the greater the benefit he or she will eventually

receive. The condition for this, of course, should also be the transparency and partnership of all subjects of this interaction.

III. CONCLUSION

Since the digitalization of business processes requires enterprises to attract significant resources, governmental support for private investment is needed. Some steps have already been taken in this direction in Russia. In September 2018, the Industrial Development Fund began to accept applications under the new program "Digitalization of industry" which is aimed at the introduction of digital and technological solutions designed to optimize production processes in the enterprise. Under this program, industrial enterprises can obtain loans from 20 to 500 million rubles for a period up to five years. The total project budget starts from 25 million rubles, with co-financing from the applicant, private investors or banks being at least 20% of the project budget.

Industrial enterprises are encouraged to form industry associations for co-financing and risk reduction implementation of projects for digital upgrades, as well as for interaction with public authorities, technology companies and research centers and collaborative development of industry platforms, solutions and standards.

With a sufficient amount of investment, the digitalization of business processes of all participants in industrial production can provide high rates of economic growth and become the basis for the creation of a new structure of the country's economy.

References

- [1]. G. Abdrakhmanova, K. Vishnevskiy, G. Volkova, L. Gokhberg, A. Demyanova, E Dyachenko, et al., "Digital Economy Indicators in the Russian Federation". National Research University Higher School of Economics. Moscow: HSE, 2018.
- [2]. A. Aptekman, V. Kalabin, V. Klintsov, E. Kuznetsova, V. Kulagin, I. Yasenovets, "Digital Russia: a new reality. McKinsey & Company", 2017. Retrieved from: <https://www.mckinsey.com/~/media/McKinsey/Locations/Europe%20and%20Middle%20East/Russia/Our%20Insights/Digital%20Russia/Digital-Russia-report.ashx>
- [3]. B. Eckhardt, R. Gold, "Adult training in the digital age. Economics", Open-Assessment E-Journal, vol. 12 (2018-36), pp. 1–14, 2018.
- [4]. A. Crabtree, T. Lodge, J. Colley, C. Greenhalgh, R. Mortier, H. Haddadi, "Enabling the new economic actor: data protection. the digital economy and the Databox". *Pers Ubiquit Comput*, vol. 20, pp. 947–957, 2017.
- [5]. M.R. Cunningham, J.W. Jones, B.W. Dreschler, "Personnel risk management assessment for newly emerging forms of employee crimes", *International Journal of Selection and Assessment*, vol. 26, Iss. 1, pp. 5-16, 2018.
- [6]. L.M. Fonseca, "Industry 4.0 and the digital society: concepts, dimensions and envisioned benefits". *Proceedings of the International Conference on Business Excellence*. vol. 12. Issue 1, pp. 386-397, 2018.
- [7]. M. Goos, "The impact of technological progress on labour markets: policy challenges", *Oxford Review Of Economic Policy*, vol. 34. Iss. 3, pp. 362–375, 2018.
- [8]. A.V. Gurjanov, D.A. Zakoldaev, A.V. Shukalov, I.O. Zharinov, "Cyber and physical equipment digital control system in Industry 4.0 item designing company", *International Conference Information Technologies in Business and Industry 2018*. IOP Conf. Series: Journal of Physics: Conf. Series. vol. 1015, UNSP 052035, 2018.
- [9]. R. Hagen, "The End of Ownership: Personal Property in the Digital Economy", *Science and Public Policy*, vol. 45. Iss. 1, pp. 137–139, 2016.
- [10]. A. Herala, J. Kokkola, J. Kasurinen, E. Vanhala, "Strategy for Data: Open it or Hack it?", *Journal of Theoretical and Applied Electronic Commerce Research*, vol. 14, Iss. 2, pp. 33–46.
- [11]. E. Khitskov, S. Veretekhina, A. Medvedeva, O. Mnatsakanyan, E. Shmakova, A. Kotenev, "Digital Transformation of Society: Problems Entering in the Digital Economy", *Eurasian Journal of Analytical Chemistry*, vol. 12(5b), pp. 855-873, 2017.
- [12]. H-H. Konkolewsky, "Digital economy and the future of social security", *Administration*, vol. 65, N 4, pp. 21–30, 2017.
- [13]. P.D. König, "The place of conditionality and individual responsibility in a "data-driven economy", *Big Data & Society*, pp. 1–14, 2017.
- [14]. Yu-f. Liu, J.-X. Song, "Using the Internet of Things Technology Constructing Digital Mine", *3rd International Conference on Environmental Science and Information Application Technology*, 2011.
- [15]. N.A. Nevskaya, A.P. Garnov, A.V. Brykin, E.V. Malakhova, "National Competitiveness as the Object of Indicative Planning in the Context of Re-industrialization", *European Research Studies Journal*, vol. XXI. Special Issue 1, 2018, pp. 148-155.
- [16]. F. Nwaiwu, "Review and Comparison of Conceptual Frameworks on Digital Business Transformation". *Journal of Competitiveness*, vol. 10(3), pp. 86-100, 2018.
- [17]. Yu.G. Odegov, L.S. Babynina, E.V. Aleksandrova, "Talents and The War for Them", *Actual Problems of Economics*, No 3 (165), pp. 275–281, 2015.
- [18]. Oxford Economics. 2011. *The New Digital Economy: How it will transform business*. Retrieved from: <https://www.pwc.com/mt/en/publications/assets/the-new-digital-economy.pdf>
- [19]. S. Ranchordás, "Digital agoras: democratic legitimacy. online participation and the case of Uber-petitions", *The Theory and Practice of Legislation*, vol. 5, No 1, pp. 31-54, 2015.
- [20]. B. Raue, "Free Flow of Data? The Friction between the Commission's European Data Economy Initiative and the Proposed Directive on Copyright in the Digital Single Market", *International Review Of Intellectual Property And Competition Law*, vol. 49, Iss. 4, pp. 379–383, 2015.
- [21]. S. Roshchin, S. Solntsev, D. Vasilyev, "Recruiting and Job Search Technologies in the Age of Internet", *Foresight and STI Governance*, vol. 11, no 4, pp. 33–43, 2017.
- [22]. I. Stepanov, "Small business bets on the digital", *Expert Siberia*, vol. 7(508), 2018.
- [23]. S. Wadmann, K. Hoeyer, "Dangers of the digital fit: Rethinking seamlessness and social sustainability in data-intensive healthcare". *Big Data & Society*, vol. 1–13, 2018.
- [24]. H. Ward, "HR Tech in Russia". URL: http://wardhowell.com/teinstitute/magazine_10/hr_tech_v_rossii/
- [25]. A.N. Zakharov, "The Problem of Reindustrialization of the World Economy". *MGIMO Review of International Relations*, Issue: 1 (58) pp. 213-245, 2018